

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A multi-pole switching system comprising:

5 a) a series of parallel contactor bars supported in a non-conductive frame and interspaced with shiftable contactors, the shiftable contractors each having generally centrally located support openings;

b) wiring connection means for coupling the contactor bars to external wiring;

10 c) an alignment shaft whereon said shiftable contactors are slideably mounted through said support openings;

the shiftable contactors being positioned to effect contact with the contactor bars by advancement along the alignment shaft and thereby achieve switch closure.

15 2. A switching system as in claim 1 comprising drive means for displacing the shiftable contactors along the alignment shaft to effect switch closure.

20 3. A switching system as in claim 2 comprising first resilient, nonconductive, first spring means positioned along the alignment shaft to bias the shiftable contactors to move, upon deactivation of the drive means, into a neutral condition.

4. A switching system as in claim 3 comprising second resilient, nonconductive, second spring means positioned along the alignment shaft,

adjacent the shiftable contactors to press the shiftable contactors resiliently against the contactor bars to obtain a good electrical contact.

5. A switching system as in claim 3 wherein said spring means is provided by silicone rubber.

5 6. A switching system as in claim 1 wherein said contactor bars and shiftable contactors are assembled in combinations that will constitute switch closures for either of the two conducting configurations of a double-pole, double-throw switch or constitute a neutral position providing an 'open' condition.

10 7. A switching system as in claim 6 comprising solenoid means for displacing the shiftable contactors along the alignment shaft to effect switch closure.

15 8. A switching system as in claim 1 in combination with a plurality of conductors to be connected to said external wiring wherein a conductor-receiving opening is formed in an end of each contactor bar and the conductors are directly coupled to the fixed contactor bars by the compressed engagement of the ends of said contactor bars around such conductors when positioned within said openings.

20 9. A switching system as in claim 8 wherein at least one of said conductors is directly connected to more than one contactor bar.

10. A system as in claim 8 wherein the conductors are free of curvature as they engage with such contactor bars.

11. A system as in claim 10 wherein the conductors are free of curvature as they approach such contactor bars.

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12. A switching system as in claim 11 wherein such conductors are fixed to eliminate their movement during operation of the switch.

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13. A switching system as in claim 7 comprising electronic means to effect operation of the solenoid means to provide a relay.

14. A switching system as in claim 13 for providing current from a supply source through cables to a battery to be charged comprising:

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a) first electrical circuit means for sensing the voltage of the battery to be charged, said first electrical circuit means having means for being connected to said battery to be charged through cables;

b) multiple solenoids actuatable by said first electrical circuit to advance the shiftable contactors along the alignment shaft respectively in both directions;

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c) means associated with said first circuit means to permit activation of the solenoids only when the cables are in contact with a battery to be charged that has a voltage that is over a preselected threshold voltage level.

15. A switching system as in claim 12 in combination with a second

electrical circuit means for sensing when not all of the cables are connected to either the supply source or the battery to be charged and thereupon for correspondingly deactivating said solenoids, said second electrical circuit means comprising:

- 5           a)     a pulse generator which provides an output pulse with a short-term duty cycle for disabling activation of the solenoids by the first electrical circuit means for the duration of the pulse;

wherein said pulse generator is connected to said first electrical circuit means to place the switch in a neutral position for the duration of said pulse,

- 10           whereafter the first electrical circuit means is operative to ensure that, if any of the cables are disconnected during the output pulse, then the switching system will stay in its neutral position upon the termination of said output pulse.

- 15           16.    A system as in claim 15 comprising a third electrical circuit means connected to disable said pulse generator and suspend the generation of pulses when the current flowing through the switch is above a threshold current value.

- 20           17.    A switching system as in claim 16 wherein said third electrical circuit means establishes that said current is over said threshold current value by sensing when the voltage of the supply source drops below a threshold voltage value.

18.    A switching system as in claim 17 wherein said threshold voltage value is in the range of 10 to 11 volts.

19. A switching system as in claim 7 comprising coupling means for attaching cables to said by which the switching system may be used to connect to batteries in parallel.